

# Benefits and Effects of Early Enteral Nutrition Following Gastrointestinal Surgery: An Observational Study

Manas Mukul Mandal<sup>1</sup>, Rajdeep Das<sup>2</sup>, Rohit Shaw<sup>3</sup>, Narendranath Mukhopadhyay<sup>4</sup>

<sup>1</sup>Former Resident Doctor, Department of General Surgery, Burdwan Medical College & Hospital, Burdwan, India.

<sup>2</sup>Former Resident Doctor, Department of General Surgery, Nil Ratan Sircar Medical College & Hospital, Kolkata, India.

<sup>3</sup>Former Resident Doctor, Department of General Surgery, Burdwan Medical College & Hospital, Burdwan, India.

<sup>4</sup>Professor, Department of General Surgery, Burdwan Medical College & Hospital, Burdwan, India.

Received: September 2020

Accepted: September 2020

## ABSTRACT

**Background:** Gastrointestinal surgery is among the most frequent surgery performed in elective and emergency settings. Enteral nutrition following GI surgery is frequently delayed because of concerns of exacerbating postoperative ileus or damaging fresh gastrointestinal anastomosis till the return of bowel sounds. In this study attempts were made to evaluate the outcome of early enteral nutrition following GI surgery. **Aims & Objectives:** To determine whether early enteral nutrition is tolerable and beneficial to the patient in terms of recovery, paralytic ileus, anastomotic leak, SSI, length of hospital stays. **Methods:** This is an observational study done in the Department of General Surgery of Burdwan Medical College and Hospital, Burdwan, over a period of 18 months. 54 patients were selected as per inclusion and exclusion criterion. All are given early enteral nutrition (within 48 hours) following surgery and evaluated for outcome. **Results:** In this study we observed significant lower number of complications in recovery period (anastomotic leak in 10.3%, paralytic ileus in 11.1% and SSI in 16.7%) and reduced length of hospital stay which is comparable with other literature on similar study. **Conclusion:** Early enteral nutrition helps in recovery and limits complication in patients following gastrointestinal surgery.

**Keywords:** Gastrointestinal Surgery, Early Enteral Nutrition, Nutrition

## INTRODUCTION

Enteral nutrition is frequently delayed unnecessarily because of concerns of exacerbating postoperative ileus or damaging fresh gastrointestinal anastomosis.<sup>[1]</sup> But copious data support the safety and benefit of initiating enteral nutrition in the setting of GI surgeries.<sup>[2,3]</sup> Along with systemic delivery of nutrients, EN performs a critical function in supporting the alimentary tract. Mucosal exposure to EN provides direct high concentration nutrients (e.g., glutamine, alanine), stimulates enteric blood flow, maintains barrier function by preserving tight junction integrity, and induces production and release of mucosal immunoglobulin and critical endogenous growth factors. These functions are not replaced with PN.<sup>[4]</sup> After dietary ingestion, polysaccharides such as fiber and starch undergo bacterial fermentation in the colonic lumen. Bacterial fermentation is essential for two major reasons: (1) support of the normal flora of the gut lumen, which prevents colonization and subsequent infection (e.g., Clostridium difficile), and (2) production of acetoacetate, propionate, and butyrate (a short-chain fatty acid). Butyrate appears to be the preferred fuel of colonic mucosa cells and is essential for mucosal integrity.

### Name & Address of Corresponding Author

Dr. Manas Mukul Mandal  
Niharandini Apartment, Barrackpore,  
Kolkata- 700122  
Email id: manas095@gmail.com

Animal and human studies show that the presence of enteral feeds (in addition to or in place of PN) is associated with increased mucosal mass, mucosal oxygenation, brush-border enzyme synthesis, and villus height compared with PN alone.<sup>[5]</sup> Significant evidence suggests that, in certain clinical settings, early intestinal feeding minimizes ileus by facilitating gut motility.<sup>[6]</sup>

## AIMS AND OBJECTIVES

- Assessment of benefit and tolerability of early enteral nutrition (within 48 hours) after gastrointestinal surgery (enteric anastomosis and stoma formation).
- Evaluation with special regards to patient recovery, rate of postoperative anastomotic leak, postoperative paralytic ileus, rate of surgical site infections, rate of minor gastrointestinal disturbances and postoperative length of hospital stay.

## MATERIALS AND METHODS

### Study Design:

Observational study  
**Study Area:** Department of General Surgery of Burdwan Medical College and Hospital, Burdwan.

**Study Population:** 54 patients randomly selected undergoing gastrointestinal surgery as laparotomy and entero-enteric anastomosis or stoma formation.

**Study Period:** December 2017 to May 2019.

### Inclusion Criteria:

Patients aged 12-70 years who are scheduled to undergo laparotomy and entero-enteric anastomosis

or stoma formation for emergency or elective reasons / elective closure of previously conducted ileostomies / colostomies.

#### **Exclusion Criteria:**

1. Gross contamination of peritoneal cavity prior to surgery (hollow viscus rupture duration of more than 6 hours).
2. Re-laparotomies.
3. Patients with organ failures & spinal injuries.
4. Immuno-compromised patients.
5. Patients in septic shock or requiring critical care.
6. Patients age (<12 years and >70 years).
7. Patients with IBD / non-specific colitis, enteropathies, Diabetes Mellitus.
8. Gastrostomy or any pre anastomotic diversion.
9. Multiple anastomoses.
10. Patients who do not consent to be included in the study.

#### **Ethical Consideration:**

Strict privacy and confidentiality was maintained throughout the study. Identity of participants will not be disclosed. Informed written consent was taken from every patient. Study was conducted after obtaining permission from Institutional Ethics Committee (IEC).

## RESULTS

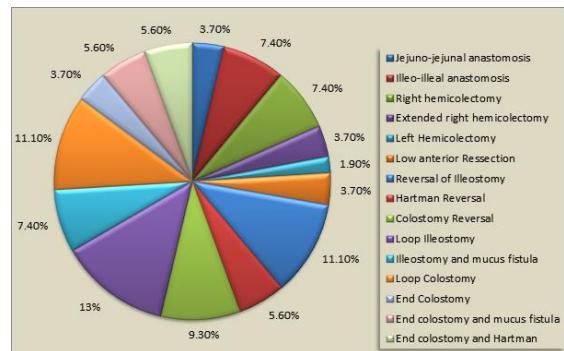
**Table 1: Age and Sex Distribution**

Age [years]	Sex		Total
	Male	Female	
10-20	1	1	2
21-30	7	3	10
31-40	10	4	14
41-50	5	6	11
51-60	6	4	10
61-70	5	2	7
	34 (63%)	20 (37%)	54 (100%)

In this study we had 54 patient with age ranged from 12 to 70 years with a mean age of  $42.056 \pm 13.705$  years. Among them 34 patients were male and 20 patients were female with a percentage of 63% and 37% respectively. It can be compared to the study of Delaney et al,<sup>[7]</sup> where he found early post-operative

feeding was particularly beneficial for patients younger than 70 years old.

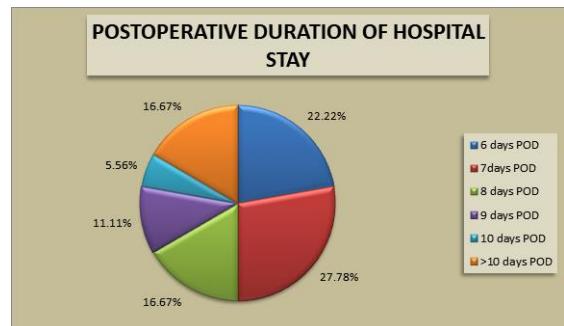
Different types of gastrointestinal surgeries has been take into consideration in the study group both anastomotic procedure and stoma formation. Among which most common anastomotic procedure was Illeostomy Reversal in 6 patients with a percentage of 11.1%. And most common stoma procedure performed was Loop Illeostomy in 7 (13%) patients.



**Figure 1: Different Operative Procedures**

#### **Complications**

Among the 29 patients who underwent anastomosis 3 (10.3%) patient had anastomotic leak and was managed accordingly. Every patient were given early enteral nutrition and only 6 (11.1%) developed paralytic ileus. Among total of 54 patients 9 (16.7%) patients had surgical site infection in the post-operative period. 6 (11.1%) patients developed chest infection in the post-operative period and 16 (29.6%) patients developed gastrointestinal disturbances.



**Figure 2: Postoperative Hospital Stay**

**Table 2: Complications**

Complications	Present		Absent	
	Number	Percentage	Number	Percentage
Anastomotic Leak	3	10.3%	26	89.7%
Paralytic Ileus	6	11.1%	48	88.9%
SSI	9	16.7%	45	83.3%
Chest infections	6	11.1%	48	88.9%
GI disturbances	16	29.6%	38	70.4%

The mean days of postoperative stay in the hospital were  $7.960 \pm 1.96$  days in the study population.

## DISCUSSION

Intestinal anastomosis and stoma are very frequently performed surgery as emergency and elective procedures due to traumatic rupture, benign or

malignant condition or obstruction and in some other inflammatory conditions.

I. In this study, we found that bowel sounds, flatus and stools appeared in a significant shortened period of time after early enteral nutrition. Fanaie et al,<sup>[8]</sup> in their study also indicated there is no significant difference in the appearance of bowel sounds among patients of two groups of early and delayed enteral feeding.

II. There was a significant decrease in the incidence of surgical site infection (16.7%) following early enteral nutrition. Schroeder et al,<sup>[9]</sup> specified that postoperative early enteral nutrition is associated with better wound healing. The results of meta-analysis of 11 studies by Lewis et al,<sup>[10]</sup> have also indicated that incidence of wound infection is 3-30% in early fed group.

III. However, the incidence of minor gastrointestinal disturbances (i.e. nausea, vomiting, diarrhea, distension) was significant. Nearly 30% of the patients developed gastrointestinal disturbances in the post-operative period. But almost 70% patient did not develop any significant GI disturbances. Stewart et al,<sup>[11]</sup> found similar outcome of tolerance to early oral feed is much less (65%).

IV. The overall postoperative length of stay following early enteral nutrition decreases significantly ( $7.96 \pm 1.96$  days).

V. In this study we found no significant correlation between early enteral nutrition and development of complications like anastomotic leak (10.3%), paralytic ileus (11.1%) and postoperative chest infections, which is comparable to other studies. Ahmad et al,<sup>[12]</sup> also found anastomotic leak in one patient (3.57%) in early group as compared to nine patients (32.1%) in delayed oral feeding group after elective gut anastomosis which was statistically significant ( $p=0.012$ ). Di Fronzo et al,<sup>[13]</sup> in a study on EEF after colonic resection and anastomosis had a zero rate of anastomotic leak compared with a leak rate of 3-10% in colorectal surgery with conventional delayed enteral feeding. Livingston and Passaro,<sup>[14]</sup> in their study concluded that early enteral feeding induces bowel motility and helps in postoperative paralytic ileus. Beier and Holgerson et al,<sup>[15]</sup> demonstrated a higher incidence of infection (46%) in the delayed feeding group after major abdominal surgery compared to 6% in the early feeding group.

VI. Weaknesses of the study: All the emergency surgeries which were likely candidates of this study during this period were excluded either due to gross contamination of peritoneal cavity prior to surgery or due to presence of septic shock / patient requiring critical care.

Characteristics	Average	
Age [years]	<b>42.056 ± 13.705</b>	--
Gender [M/F]	34 (63%)	20 (37%)
BMI	$22.44 \pm 2.364$	--
Audible bowel sounds [days]	$2.648 \pm 1.067$	--
Passage of flatus [days]	$3.315 \pm 1.146$	--
Passage of stools [days]	$4.093 \pm 1.186$	--
	Number	Percentage
Cancer surgeries	17	31.5%
Anastomotic leak	3	10.3%
Paralytic ileus	6	11.1%
SSI	9	16.7%
Chest infections	6	11.1%
GI disturbances	16	29.6%
Length of stay (days)	$7.960 \pm 1.96$	
Mortality	1	1.9%

## CONCLUSION

Early institution of enteral nutrition after major surgery minimizes the risk of under-nutrition and can abate the hyper-metabolic response seen after surgery. In a post-surgical patient in whom enteral nutrition initiated within 48 hours is associated with decreased length of hospital stay in days and infectious complications.

## REFERENCES

- McClave SA, Kozar R, Martindale RG, Heyland DK, Braga M, Carli F, Drover JW, Flum D, Gramlich L, Herndon DN, Ko C. Summary points and consensus recommendations from the North American Surgical Nutrition Summit. *Journal of Parenteral and Enteral Nutrition*. 2013 Sep;37:99S-105S.
- Barlow R, Price P, Reid TD, Hunt S, Clark GW, Havard TJ, Puntis MC, Lewis WG. Prospective multicentre randomised controlled trial of early enteral nutrition for patients undergoing major upper gastrointestinal surgical resection. *Clinical Nutrition*. 2011 Oct 1;30(5):560-6.
- Osland E, Yunus RM, Khan S, Memon MA. Early versus traditional postoperative feeding in patients undergoing resectional gastrointestinal surgery: a meta-analysis. *Journal of parenteral and enteral nutrition*. 2011 Jul;35(4):473-87.
- Alverdy JC, Aoys E, Moss GS. Total parenteral nutrition promotes bacterial translocation from the gut. *Surgery*. 1988 Aug 1;104(2):185-90.
- Groos S, Hunefeld G, Luciano L. Parenteral versus enteral nutrition: morphological changes in human adult intestinal mucosa. *Journal of submicroscopic cytology and pathology*. 1996 Jan;28(1):61-74.
- Boelens PG, Heesakkers FF, Luyer MD, van Barneveld KW, de Hingh IH, Nieuwenhuijzen GA, Roos AN, Rutten HJ. Reduction of postoperative ileus by early enteral nutrition in patients undergoing major rectal surgery: prospective,

randomized, controlled trial. *Annals of surgery*. 2014 Apr 1;259(4):649-55.

- 7. Delaney CP, Fazio VW, Senagore AJ, Robinson B, Halverson AL, Remzi FH. 'Fast track' postoperative management protocol for patients with high co-morbidity undergoing complex abdominal and pelvic colorectal surgery. *British Journal of Surgery*. 2001 Nov 1;88(11):1533-8.
- 8. Fanaee SA, Ziae SA. Safety of early oral feeding after gastrointestinal anastomosis: a randomized clinical trial. *Indian Journal of Surgery*. 2005 Aug 1;67(4).
- 9. Dag A. A randomized controlled trial evaluating early versus traditional oral feeding after colorectal surgery. *Clinics* [online]. 2011, vol. 66, n. 12. ISSN. 1807-5932:2001-5.
- 10. Lewis SJ, Egger M, Sylvester PA, Thomas S. Early enteral feeding versus "nil by mouth" after gastrointestinal surgery: systematic review and meta-analysis of controlled trials. *Bmj*. 2001 Oct 6;323(7316):773.
- 11. Stewart BT, Woods RJ, Collopy BT, Fink RJ, Mackay JR, Keck JO. Early feeding after elective open colorectal resections: a prospective randomized trial. *Australian and New Zealand Journal of Surgery*. 1998 Feb;68(2):125-8.
- 12. Halim A, Ahmad K, Ahmad I. Comparative effectiveness of early vs delayed oral feeding after elective intestinal anastomosis. *Ophthalmol Update*. 2014:75-8.
- 13. Di Fronzo LA, Cymerman J, O'Connell TX. Factors affecting early postoperative feeding following elective open colon resection. *Archives of Surgery*. 1999 Sep 1;134(9):941-6.
- 14. Livingston EH, Passaro EP. Postoperative ileus. *Digestive diseases and sciences*. 1990 Jan 1;35(1):121-32.
- 15. Beier-Holgersen R, Boesby S. Influence of postoperative enteral nutrition on postsurgical infections. *Gut*. 1996 Dec 1;39(6):833-5.

**Copyright:** © the author(s), 2020. It is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits authors to retain ownership of the copyright for their content, and allow anyone to download, reuse, reprint, modify, distribute and/or copy the content as long as the original authors and source are cited.

**How to cite this article:** Mandal MM, Das R, Shaw R, Mukhopadhyay N. Benefits and Effects of Early Enteral Nutrition Following Gastrointestinal Surgery: An Observational Study. *Ann. Int. Med. Den. Res.* 2020; 6(6):SG15-SG18.

**Source of Support:** Nil, **Conflict of Interest:** None declared